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ABSTRACT

Using data from the National Research Council's "Survey of Earned Doctorates," this research brief examines the status of women doctorates from 1978 to 1988. Text, tables, and figures present data on: (1) number and percent of women doctorates by field; (2) trends according to race, ethnicity, and sex; (3) time to degree; (4) postgraduation employment of women doctorates; and (5) employment sector commitments and primary activities of women and men doctorates. The data reveal that the proportion of doctorates awarded to women has increased substantially from 1978 to 1988. More women are earning degrees in technical fields, but degrees awarded in education, social sciences, and humanities account for two-thirds of all degrees awarded to women. The number of minority women earning doctorates has increased dramatically while the number of minority men receiving Ph.D.'s has declined. Women Ph.D.'s are more likely to enter academe after graduation than men are. Policy recommendations are offered for encouraging women to pursue doctorates in traditionally male-dominated fields and for helping academe face increased competition from other sectors for doctorates. Nine end notes, a bibliography of eight items, and a note about the data resource are provided. (JDD)

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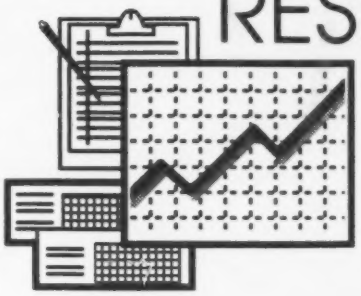

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Division of Policy Analysis and Research
American Council on Education, Washington, D.C.

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Jennifer Hess, Cecilia Ottinger, and Joan Lippincott*

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Jennifer Hess, Cecilia Ottinger, and Joan Lippincott*

Today's doctorate recipients constitute a key component of the future professoriate of U.S. higher education. As we move into the 1990s, a look at trends among doctorate recipients offers a good basis for understanding hiring circumstances facing U.S. universities and colleges in this decade.

Of most interest is the fact that a significant and growing proportion of doctorate recipients are women. This calls for a closer examination of the nature of their participation in higher education. In which fields are women earning degrees? Where are women doctorates employed after receiving those degrees, and in what types of activities are they engaged? How have women doctorates responded to changing labor market conditions? How long does it take to earn a new doctorate?

Using data from the National Research Council's *Survey of Earned Doctorates*, this brief examines the status of women doctorates from 1978 to 1988, in order to get a more precise sense of the recent history and possible future of this trend in doctorate production.

HIGHLIGHTS

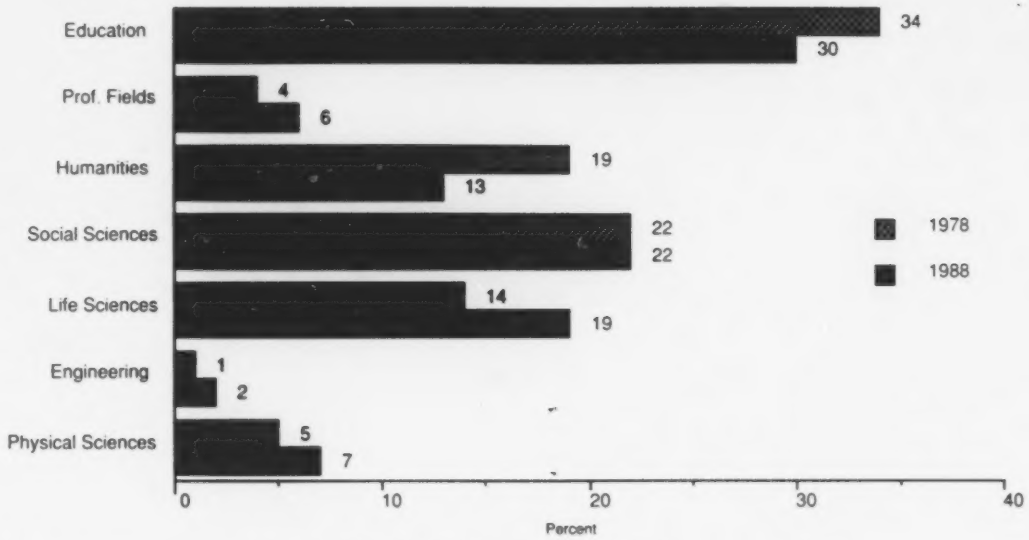
- In the last decade the proportion of doctorates awarded to women has increased substantially.
- The participation of women in graduate school across various disciplines remains uneven. Although more women now are earning degrees in technical fields, the degrees awarded in education, the social sciences, and the humanities still account for two-thirds of all degrees awarded to women. Women Ph.D's are still underrepresented in the fields of physical sciences and engineering.
- The number of minority women earning doctorates has increased dramatically while the number of minority men receiving Ph.D's has declined.
- Women Ph.D's are more likely to enter academe after graduation than men. However, there has been a decline in the number of women doctorates entering academe.

IMPLICATIONS

- If proportionately fewer women are earning doctorates in the technical fields, how can campuses add more women to those faculties?
- With more Ph.D's moving into non-academic work settings, academe may face increased competition from other sectors for doctorates. Colleges and universities are finding it more difficult to get top applicants to accept positions particularly in business, computer science, mathematics and the health professions. How does this phenomenon relate to recent women Ph.D's—how are they represented in those fields, and are there particular incentives higher education should offer to attract women into academic professions?

*Jennifer Hess, was formerly a Research Assistant at ACE; Cecilia Ottinger is the Assistant Director of the Division of Policy Analysis and Research at ACE; and Joan Lippincott is a Research Associate at ACE.

Figure 1
Percent of Doctorates Awarded to Women, by Field, 1978 and 1988



Note: Data is for all women U.S. citizens and Non-U.S. citizens
Source: National Research Council, 1990

Number of Women Doctorates, by Field 1978–88

- More and more women are earning doctorates. In 1978, women received 27 percent of the doctorates awarded. By 1988, that figure had jumped to 35 percent.

- While the total number of doctorates awarded remained relatively steady during that ten-year span, the number earned by U.S. women increased 30 percent. In contrast, the number earned by U.S. men decreased 22 percent.

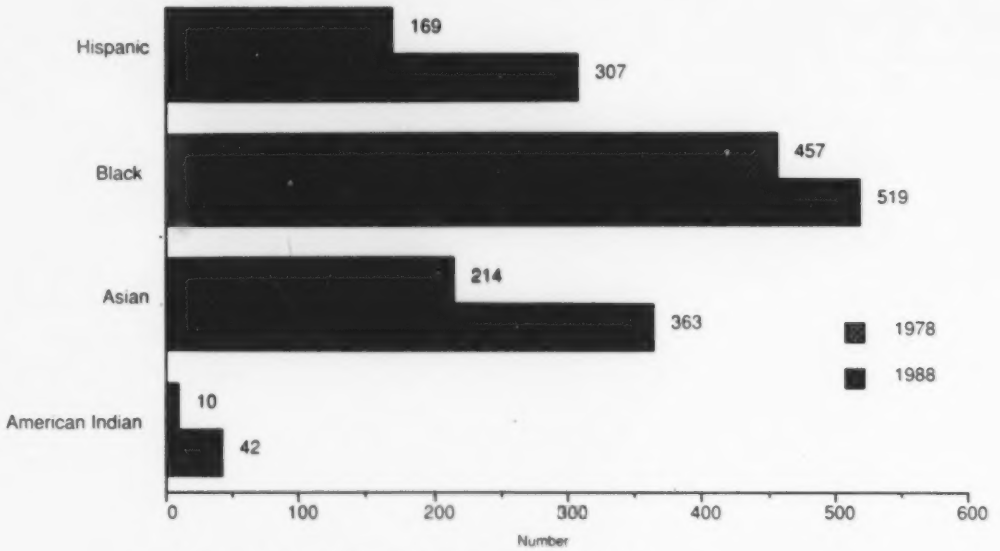
- Along with this significant increase in women earning doctorates, a shift is apparent in the doctoral fields they pursued. From 1978 to 1988, proportionately more women pursued doctorates in the physical sciences, engineering, life sciences, and professional fields, whereas proportionately fewer women pursued doctorates in the social sciences, humanities, and education. While this trend is noteworthy, doctorates in the latter three fields still accounted for two-thirds of all doctorates awarded to women in 1988 (Figure 1).

- This phenomenon of increased participation in certain fields, combined with an abiding interest in more traditionally popular fields, is illustrated by data pertaining to engineering. During the decade 1978 to 1988, there was more than a five-fold increase in the number of engineering doctorates awarded to women (from 53 to 286); however, only 2 percent of all doctorates awarded to women in 1988 were in engineering.

- Similarly, twice as many women earned doctorates in the physical sciences in 1988 as did a decade earlier (439 in 1978 versus 880 in 1988), yet doctorates in the physical sciences accounted for only 7 percent of all doctorates awarded to women in 1988.

- Although the proportion of women receiving doctorates in engineering and the physical sciences has risen in the past 10 years, in 1988 women still comprised a relatively small percentage of these doctorates; 19 percent of the doctorates in the physical sciences and 7 percent of those in engineering.

Figure 2
Number of Minority Women Doctorates, by Race/Ethnicity, 1978 and 1988



Note: Data is for U.S. citizens and permanent residents.
Source: National Research Council, 1990

- Education was the only broad field[1] in which women received more than half of the doctorates awarded in 1988 (3,507 out of 6,349). The majority of doctorates in education have been awarded to women since 1983. This contrasts with data from the beginning of that ten-year period. In 1978, women received two-fifths of the doctorates in education (2,855 out of 7,194).

- Although not a majority, women have earned a sizable proportion of the degrees awarded in the humanities and the social sciences. Since 1980, women have received at least 40 percent of the degrees awarded in these two fields.

Trends According to Race, Ethnicity, and Sex

- There have been proportionately larger increases in earned doctorates among minority women than among white women in the past 10 years. The number of doctorates awarded to white women increased 35 percent, whereas minority women doctorates increased 45 percent. However, in both cases the increases primarily occurred in the first half of the decade (1978–1983), with gains of less than 10 percent in the latter five years (1983–1988).

- Much of the increase in overall minority doctorate recipients was due to the increase in the number of minority women receiving doctorates; 8 percent fewer minority men were awarded doctorates, compared to a 45 percent increase in the number of minority women doctorate recipients.

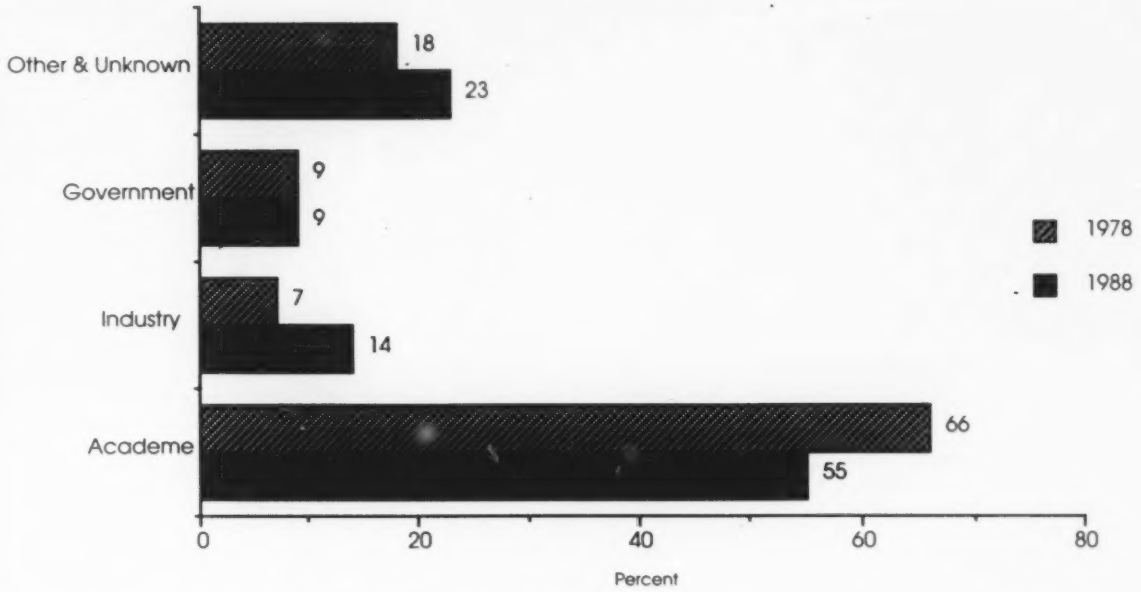
- The increase in the number of doctorates awarded to women was not equally distributed among races. While the number of American Indian, Asian, and Hispanic women awarded doctorates increased at least 70 percent from 1978 to 1988, black women doctorates increased only 14 percent (Figure 2).

Postgraduation Employment of Women Doctorates

- The distribution of postdoctoral employment to academe,[2] to industry, to government, or "other"[3]—has shifted over the past 10 years.

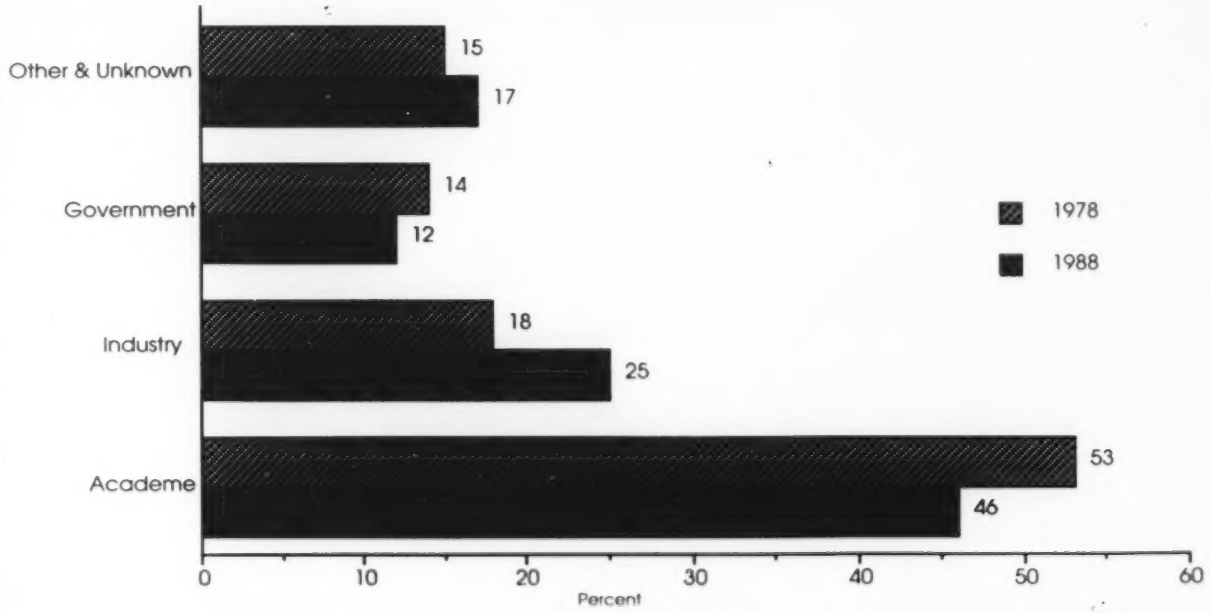
- Although half of all doctorate recipients[4] are still employed in academe, the proportion has declined since 1978 from 56 to 50 percent in 1988. The percentage entering government positions has also declined from 13 to 11 percent.

Figure 3
Employment Sector Commitments of Doctorate Recipients, 1978 and 1988
Women



Note: Data is for U.S. citizens and permanent residents.
Source: National Research Council, 1990 unpublished data.

Figure 4
Employment Sector Commitments of Doctorate Recipients, 1978 and 1988
Men



Note: Data is for U.S. citizens and permanent residents.
Source: National Research Council, 1990 unpublished data.

- Although proportionately more women Ph.D's than men Ph.D's entered academe after graduation (in 1988 the figures were 55 percent for women vs. 46 percent for men), compared to 1978, this represented an 11 percent decline for women (Figures 3 and 4).

- The declining participation of women in academe is related to an increase in the proportion of women in industry. Between 1978 and 1988 the proportion of women in this sector rose from 7 to 14 percent.

Primary Activities of Women Doctorates, 1978–1988

- The primary activity of doctorates has shifted in the past ten years. While teaching in academe is still the primary activity for a substantial proportion of doctorates, there has been a sizable decrease in this field—from 46 percent in 1978 to 37 percent in 1988.

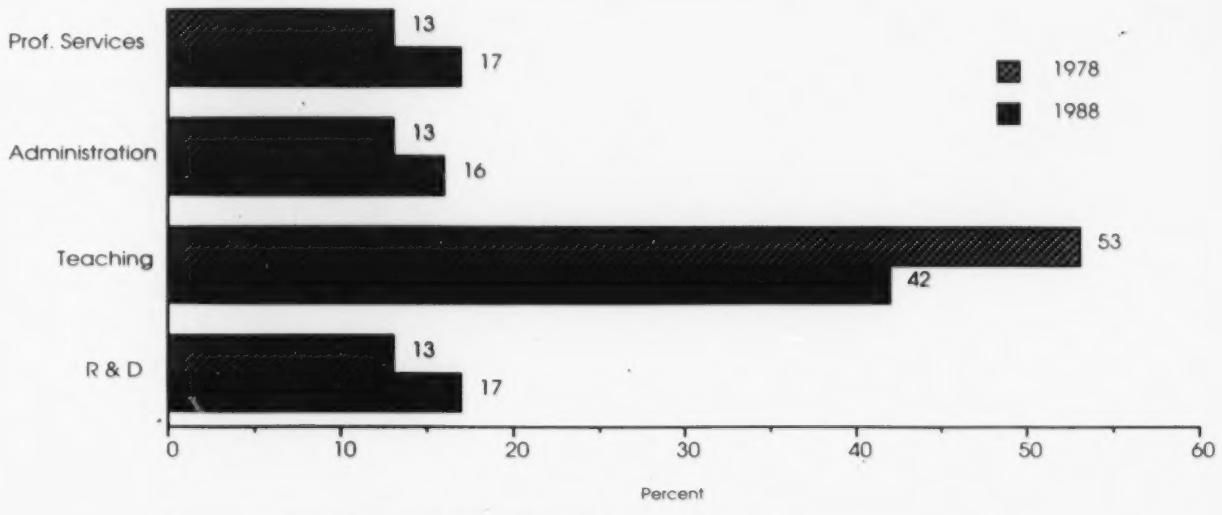
- Proportionately more women than men teach; however, the trend away from teaching, like that from higher education, has been slightly more pronounced for women than for men. The proportion of women teaching declined from 53 percent to 42 percent, while men experienced a decline from 41 to 33 percent (Figures 5 and 6).

- While there was a decline between 1978 and 1988 in the proportion of women who went into teaching, more women doctorates became involved in research and development, administration, and professional services. Increases in these three areas were evenly distributed, with the proportion of women in each increasing from approximately 13 percent in 1978 to 17 percent in 1988.

- From 1978 to 1988, declines in the proportion of women doctorates whose primary activity was teaching were evident in most fields. The most dramatic changes were in the groups of women who earned doctorates in the social sciences, engineering, and bio-sciences. Of those with social science degrees, teaching declined from 46 to 26 percent. At the same time there was an increase in professional services from 13 to 17 percent. An exception to the decline in teaching is found in the physical sciences, where there was a 7 percent increase in those women who decided to enter teaching.

- The decline in teaching among women who received doctorates in engineering and the bio-sciences was substantial but less dramatic than those in the social sciences. Between 1978 and 1988, teaching declined from 38 percent to 22 percent in engineering, and from 48 percent to 36 percent in the bio-sciences.

Figure 5
Primary Activity of Doctorate Recipients, by Sex, 1978 and 1988
Women



Source: National Research Council, 1990

- Among engineers, the move away from teaching was complemented by a 19 percent increase in research and development and a 9 percent increase in professional services. The decline in teaching among women who received degrees in the biosciences contrasted with a 6 percent increase in employment in research and development activities.

- Trends among women in other fields can be summarized as follows:
  - — Life sciences experienced small increases in administration and professional services and a decline in research and development (from 39 percent to 35 percent).
  - — Differing from other fields, the 8 percentage point drop in teaching among women with doctorates in education was absorbed solely by employment in administration, which increased from 25 percent to 33 percent.

TIME TO DEGREE

- In general, students are taking longer to complete doctorates now than they did ten years ago. From 1978 to 1988, both registered time to degree and total time to degree rose: registered time to degree by 10 months (from 6.1 years to 6.9 years), and the total time to degree by more than one-and-a-half years (from 8.9 to 10.5 years).

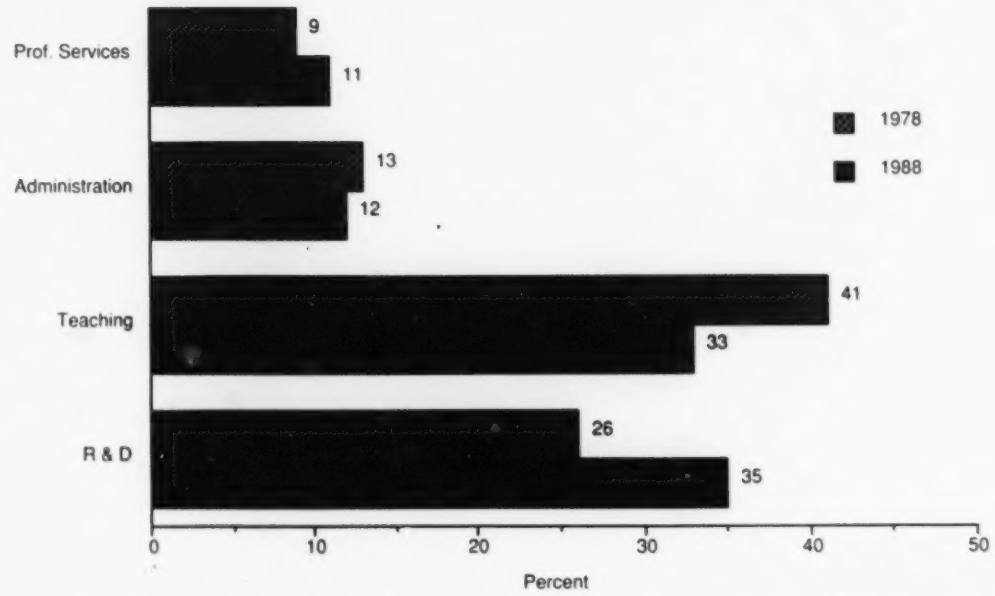
- Men tend to complete their doctoral degrees more quickly than women. A three-and-a-half-month difference in registered time to degree in 1988 (6.0 years for men and 6.3 years for women) grew to an eight-month difference in 1978 (6.7 years for men and 7.3 for women). With the exception of the humanities, this eight-month difference virtually disappears when the figures are disaggregated by field. Among humanities doctorates, women average five months longer to complete their doctorates than men.

- In 1988, women spent 1.9 years longer unenrolled between their baccalaureate and completing their doctorates than men. Much of this difference was due to the large proportion of women in education, which has the longest total time to degree of all fields—17.2 years for women and 16.5 years for men.

- The increase in registered time to degree may result from the following reasons:

  1. Students are extending their study time, either because of curricular changes or dissertation demands;
  1. Students are extending their non-study activities while on campus (i.e., they are participating in activities such as teaching); or
  3. Students are increasingly enrolled on a part-time rather than a full-time basis.[6]

Figure 6
Primary Activity of Doctorate Recipients by Sex: 1978 and 1988
Men



Source: National Research Council, 1990

Policy Implications

- Doctorates awarded to women have historically been concentrated in the field of education. While this is not necessarily bad in and of itself, it perpetuates the underrepresentation of women in other fields, most notably the physical sciences, engineering, and professional fields. As campuses aim to diversify their faculty, existing disparities between male and female doctorate recipients may impede those efforts. To overcome such disparities, women need to be encouraged to pursue doctorates in traditionally male-dominated fields.

- The movement of Ph.D's into other non-academic settings in response to the changing labor market conditions of the 1970s may have created a new demand for doctorates. Solomon and Zumeta (1981) remark, "If Ph.D. holders have successfully demonstrated their unique productivity in nontraditional work settings during a period of their relative abundance, they may have created permanent new sources of demand for their services."[7] This suggests that academe may face increased competition from other sectors for doctorates.

  Evidence of this has already surfaced. Data from *Campus Trends, 1989*,[8] a survey of American colleges and universities, indicates that half of all colleges and universities are finding it takes them longer to find qualified persons for full-time faculty positions. Additionally, half found it more difficult to get top applicants to accept positions. To date, such difficulties in recruiting qualified faculty have been particularly acute in the fields of business, computer science, mathematics, and the health professions. The survey also indicates that administrators expect the situation to worsen in the next five years.

  Another recent study, *Prospects for Faculty in the Arts and Sciences*, based on an analysis of the projected supply and demand of faculty, also indicates that colleges and universities will face future faculty shortages. Based on projected candidate-to-job ratios, the greatest shortages will be in the social sciences and humanities, rather than the sciences, as popularly believed.

- However, the coming shortage will affect virtually all fields and this represents an opportunity to increase the number of women earning Ph.D.s, particularly in those fields where they are most underrepresented: the sciences and engineering. In this regard, we suggest that: 1) universities work to shorten the time it takes to complete a doctorate degree by reducing the amount of time graduate students spend teaching; 2) universities and the federal government increase the number of graduate fellowships available; 3) universities continue to pursue new and expanded retention programs; 4) gender specific fellowships be developed; 5) undergraduate summer research internships that have proven so successful be targeted at women and; 6) early and better undergraduate advising be designed to make it more likely that women with interests and abilities in the science fields begin to take the necessary science and math courses early on.

The Division of Policy Analysis and Research publishes the ACE Research Brief Series, a collection of analytical papers exploring timely and pertinent issues in higher education. Current topics include trends in minority student participation, student employment, community college students, and the labor market for college graduates. The series is published eight times a year and is available for $50 for one year, $95 for two years, or $135 for three years. ACE members receive a 10 percent discount. To order, contact the Division of Policy Analysis and Research, American Council on Education, One Dupont Circle NW, Washington, D.C. 20036, (202) 939-9450.

Elaine El-Khawas, Vice President, Policy Analysis and Research

Cecilia Ottinger, Editor, Research Brief Series

ENDNOTES

1. Broad fields includes the following: physical sciences, engineering, life sciences, social sciences, humanities, education, and professional fields.
2. Academe includes two- and four-year colleges and universities, medical schools, and foreign universities.
3. "Other" includes elementary and secondary schools, nonprofit organizations and self-employment.
4. Data is for U.S. citizens and permanent residents.
5. Registered time to degree (RTD) is a net measure and subtracts out the time the candidate spends unenrolled in school between the baccalaureate and completing the doctorate. Total time to degree (TTD) is a gross measure of the period elapsed from the baccalaureate to completing the doctorate.
6. National Research Council, Summary Report 1987, Doctorate Recipients from United States Universities (Washington, D.C.: National Academy Press), 29.
7. Lewis C. Solomon, et al., *Underemployed Ph.Ds* (Lexington, MA: D.C. Heath, 1981), 22.
8. Elaine El-Khawas, *Campus Trends, 1989* Higher Education Report Number 78 (Washington, D.C.: American Council on Education), 2.
9. Edward B. Fiske, "Shortage Seen for Faculties for the 1990's," *The New York Times*, 13 September 1989. Also see: William G. Bowen and Julie Ann Sosa, *Prospects for Faculty in the Arts and Sciences* (Princeton, N.J.: Princeton University Press, 1989).

RESOURCE

The Survey of Earned Doctorates has been conducted each year since 1958 by the National Research Council's Office of Science and Engineering Personnel, formerly the Commission on Human Resources. Questionnaires are filled out by the graduates as they complete all requirements for their doctorates. Records for students not completing the questionnaires are compiled from commencement bulletins, registrar's records, and other published materials. Doctorates in research and applied-research are included in the survey. Professional degrees such as M.D., D.D.S., OD., D.V.M. and J.D. are excluded. A complete listing of all degrees included in the survey is printed in the back of the *Summary Report 1988: Doctorate Recipients From United States Universities.*

Inquiries regarding the survey should be addressed to:

Doctorate Recipients Project
Office of Science and Engineering Personnel
National Research Council
2101 Constitution Avenue, NW
Washington, D.C. 20418

Tel: 202-334-3161

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